

WHAT IS CLAIMED AS NEW AND IS DESIRED TO BE SECURED BY LETTERS
PATENT OF THE UNITED STATES IS:

- 5 *Sub 4*
1. In a probe device, an improved contact probe comprising:
a film;
a plurality of wiring patterns formed on the film, each wiring pattern having a front
end portion projecting from the film so as to form contact pins; and
a metal layer provided on the film
 2. The probe device according to Claim 1, wherein the contact pins of the contact
probe are made of a nickel-manganese alloy including manganese in a range from 0.05 wt.%
to 1.5 wt.%.
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 3. The probe device according to Claim 1, wherein the contact pins of the contact
probe are bent at a middle position thereof.
 4. The probe device according to Claim 3, wherein each of the contact pins of the
contact probe has a tip portion opposite an end portion, the tip portion configured such that
when the tip portion is brought into contact with an object of measurement, an angle of the tip
portion with respect to a contact face thereof is in a range of 60° to 90°, and the end portion
configured such that an angle of the end portion with respect to the contact face is in a range
of 0° to 30°.
 5. The probe device according to claim 4, further comprising:
20 a substrate attached to the contact probe, the substrate having terminals connected to
respective base ends of the wiring patterns; and
an inclination holding member having a lower face inclined at angle in a range of 0°
to 30° with respect to the contact face of an object of measurement and configured to

maintain the end portion so that the angle of the end portion with respect to the contact face is in the range of 0° to 30°;

wherein the contact probe is supported by the inclination holding member such that the metal layer of the film is brought into contact with the lower face of the inclination holding member.

6. The probe device according to Claim 1, the contact probe further comprising:

a contact probe main body including a plurality of the wiring patterns disposed as main wiring patterns; and

a contact probe branch portion which branches from the contact probe main body, integrally formed with the contact probe main body, and includes a plurality of the wiring patterns disposed as branch wiring patterns formed by dividing portions of the main wiring patterns.

7. The probe device according to Claim 6, further comprising:

a wiring substrate having a plurality of substrate side wiring patterns respectively connected to middle portions or rear end portions of the main wiring patterns and the branch wiring patterns; and

support members for supporting respective front end portions of the main wiring patterns.

8. The probe device according to Claim 7, wherein the wiring substrate comprises a

rectangular opening for arranging the contact probe, a plurality of the contact pins of the contact probe are arranged along a diagonal line of the rectangular opening and the contact probe main body and the contact probe branch portion are respectively distributed to two sides of the rectangular opening opposed to the diagonal line; and

wherein the main wiring patterns and the branch wiring patterns are respectively connected to the substrate side wiring patterns at the two sides of the rectangular opening.

9. The probe device according to Claim 7, wherein the substrate side wiring patterns are respectively formed on a front face and a back face of the wiring substrate;

5 wherein the contact probe main body and the contact probe branch portion are respectively distributed to the front face and the back face of the wiring substrate by folding a portion of either one thereof; and

wherein the main wiring patterns and the branch wiring patterns are respectively connected to the substrate side wiring patterns at the two sides of the rectangular opening.

10 The probe device according to Claim 1, the contact probe further comprising:
a contact probe main body including the wiring patterns disposed as a plurality main wiring patterns; and

at least one of branch wiring plate connected to the contact probe main body by attaching a portion of the branch wiring plate to the contact probe main body, and including a plurality of branch wiring patterns;

wherein the branch wiring patterns are each connected to portions of the plurality of main wiring patterns.

11. A probe device according to Claim 10, further comprising:
a wiring substrate having a plurality of substrate side wiring patterns respectively connected to middle portions or rear end portions of the main wiring patterns and the branch wiring patterns; and

supporting members for supporting the respective front end portions of the main wiring patterns;

wherein the substrate side wiring patterns are respectively formed on a front face and a back face of the wiring substrate;

wherein the contact probe main body and the branch wiring plate are respectively distributed to the front face and the back face of the wiring substrate; and

5 wherein the main wiring patterns and the branch wiring patterns are respectively connected to the substrate side wiring patterns at the two sides of the rectangular opening.

12. The probe device according to Claim 1, further comprising:
a plurality of the contact probes arranged such that axial lines of the contact pins are substantially vertical to a contact face of an object of measurement, and the plurality of
10 contact probes are disposed in parallel so as to provide spaces between respective faces of the films of the plurality of contact probes.

13. The probe device according to Claim 12, wherein a direction of bending of the contact pins of the plurality of the contact probes when a buckling load is applied is configured to be substantially constant.

14. The probe device according to Claim 13, wherein a position of buckling points in axial line directions of the contact pins of the plurality of the contact probes is configured to be substantially constant.

15. The probe device according to Claim 13, further comprising:

a metal film disposed on a back side the contact pins of the plurality of the contact
20 probes at a specified position in an axial line direction, and which is subjected to a half-etching treatment.

16. A contact probe comprising:
a first contact probe, including,
a first film, and
a plurality of first wiring patterns formed on the first film, each first wiring pattern
5 having a front end portion projecting from the first film so as to form contact pins; and
a second contact probe connected to the first contact probe, including,
a second film, and
a plurality of second wiring patterns formed on the second film;
wherein the plurality of second wiring patterns are connected to the plurality of first
wiring patterns, and the second contact probe is formed separately from the first contact
probe.

17. The contact probe according to the Claim 16, wherein the plurality of first wiring
patterns are densely formed, the plurality of second wiring patterns are densely formed at a
vicinity of the connection to the plurality of first wiring patterns, and the plurality of second
15 wiring patterns are coarsely formed at a position remote from the vicinity of the connection to
the plurality of first wiring patterns.

18. The contact probe according to the Claim 16, wherein the plurality of first wiring
patterns are formed densely at front end portions thereof and are coarsely formed at rear end
portions thereof, and the plurality of second wiring patterns are coarsely formed and
20 connected to the first wiring patterns at the rear end portions thereof.

19. The contact probe according to Claim 17, wherein an area of the first contact
probe is configured to be smaller than an area of the second contact probe.

20. The contact probe according to Claim 18, further comprising:

an anisotropic conductive tape connecting the first contact probe and the second contact probe such that a face of the first contact probe where the plurality of first wiring patterns are formed is opposed to a face of the second contact probe where the plurality of second wiring patterns are formed.

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